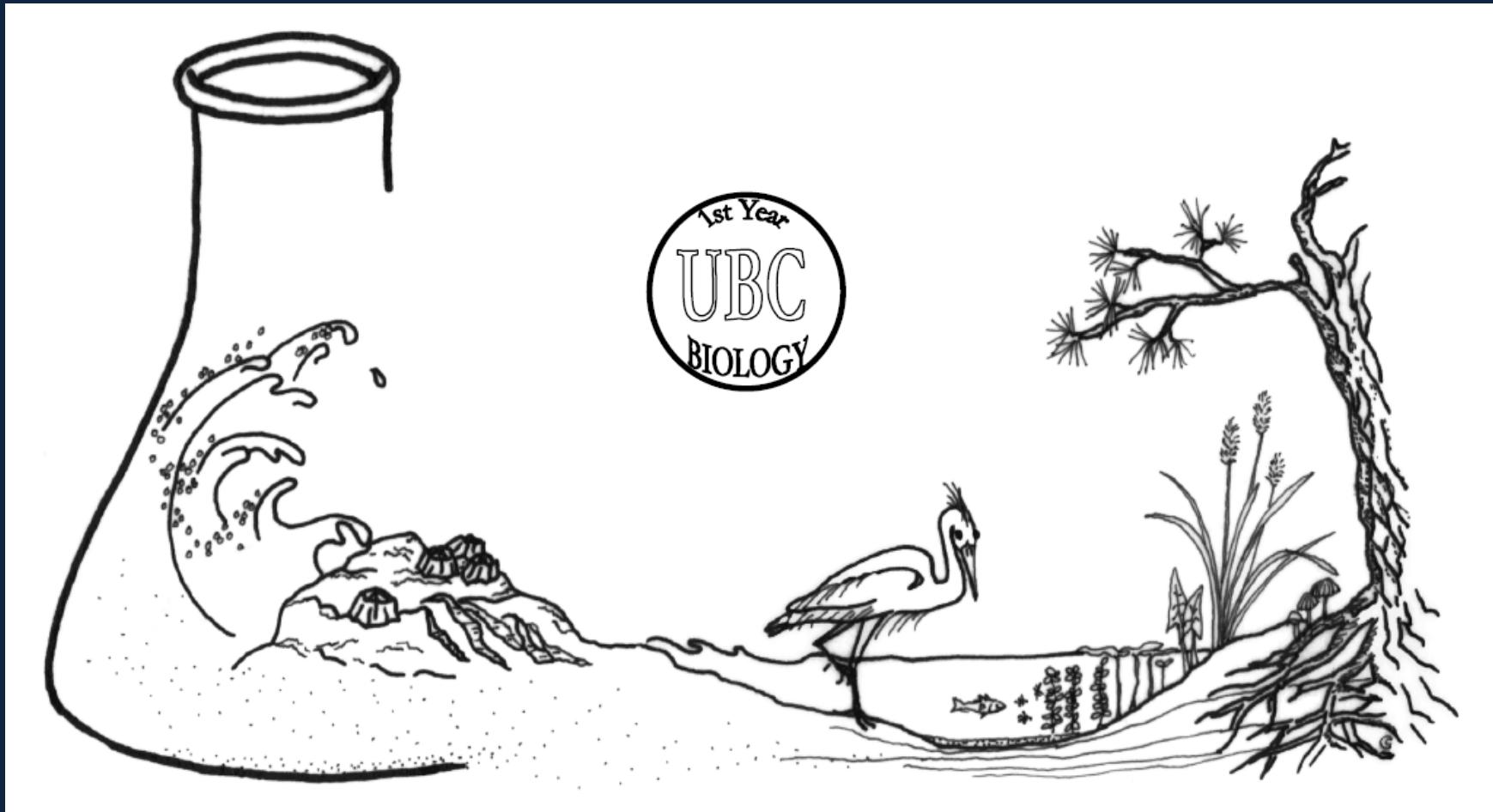


Biology 140 Renewal: Responding to student feedback



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Biology 140 Laboratory Investigations in Life Science

- First year laboratory course
- Large enrolment (1500 students/year)
 - Each section ~ 24 students
- 3 hr lab once/week (no lecture component)
- Required for life science majors, some non-UBC med schools

Biology 140 Laboratory Investigations in Life Science

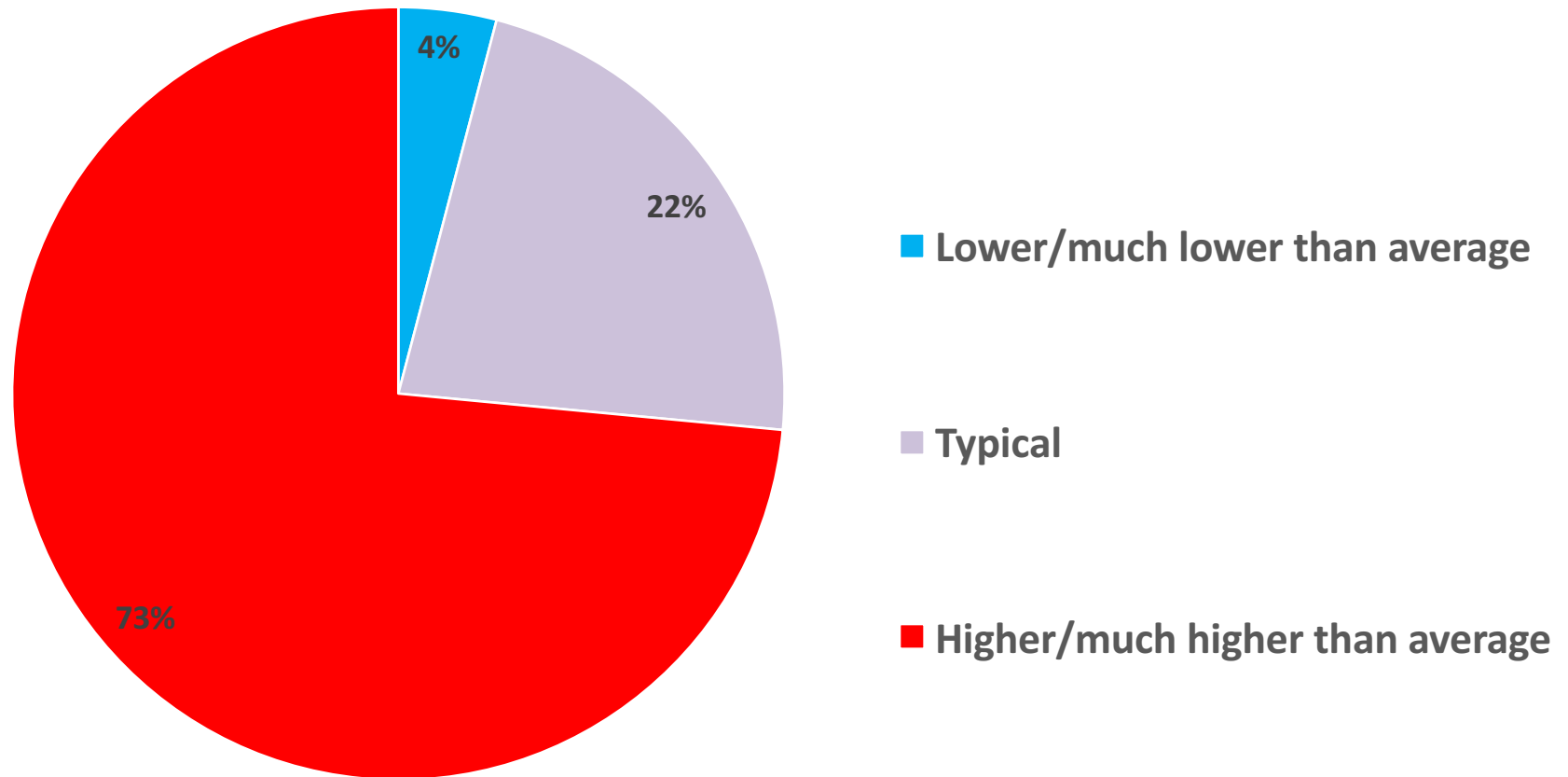
- Inquiry learning
- Design & conduct lab experiment
 - Effects of abiotic factors on animals
 - Marine & terrestrial term
- Group work
- Write scientific paper
- Field study



The challenge...student experience

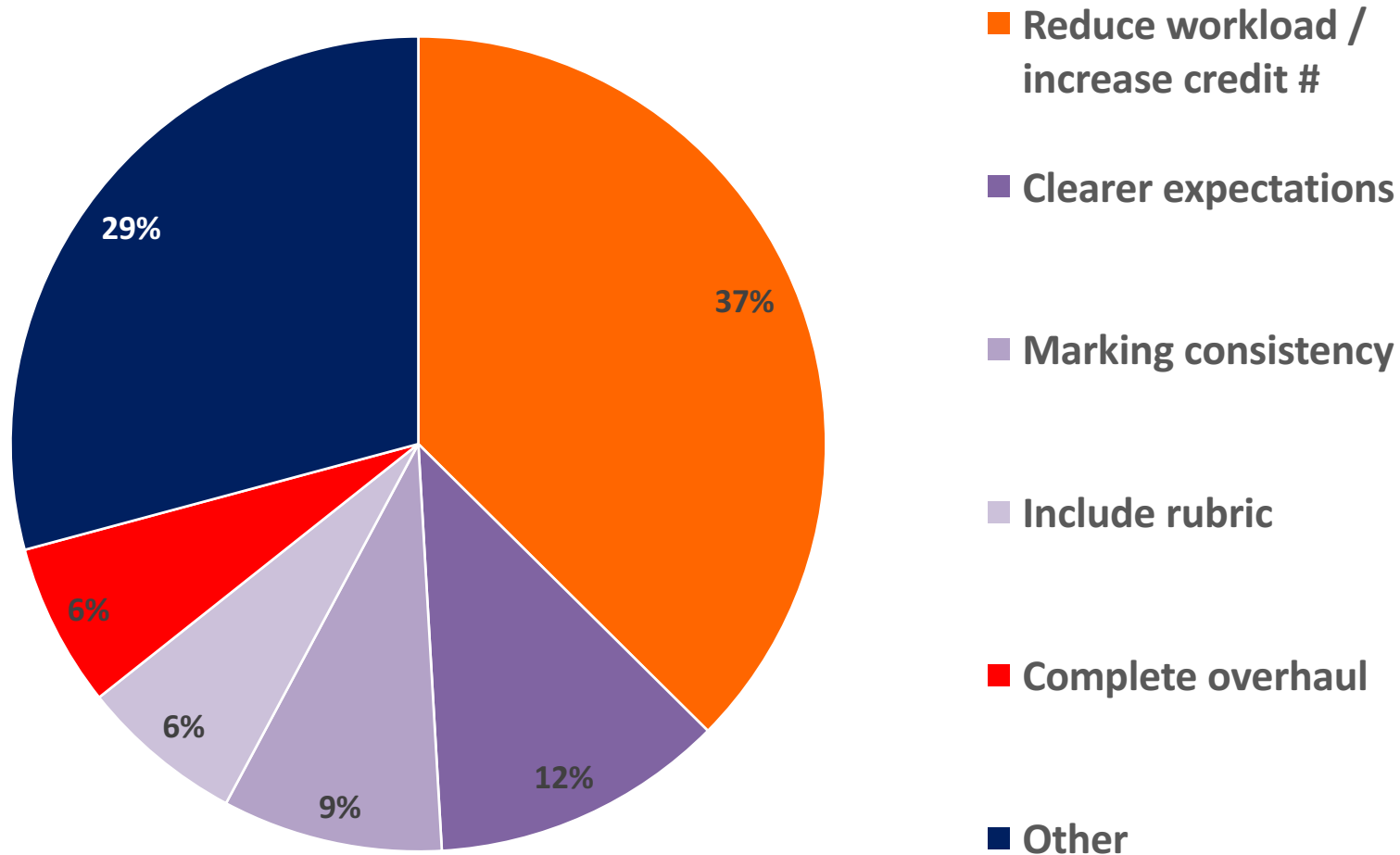
- Low student satisfaction (yearly course evals, past student survey)
 - Workload
 - Assessment clarity and expectations
 - Authenticity of research experience

Challenge: student perception of workload (compared to other labs)



n = 732

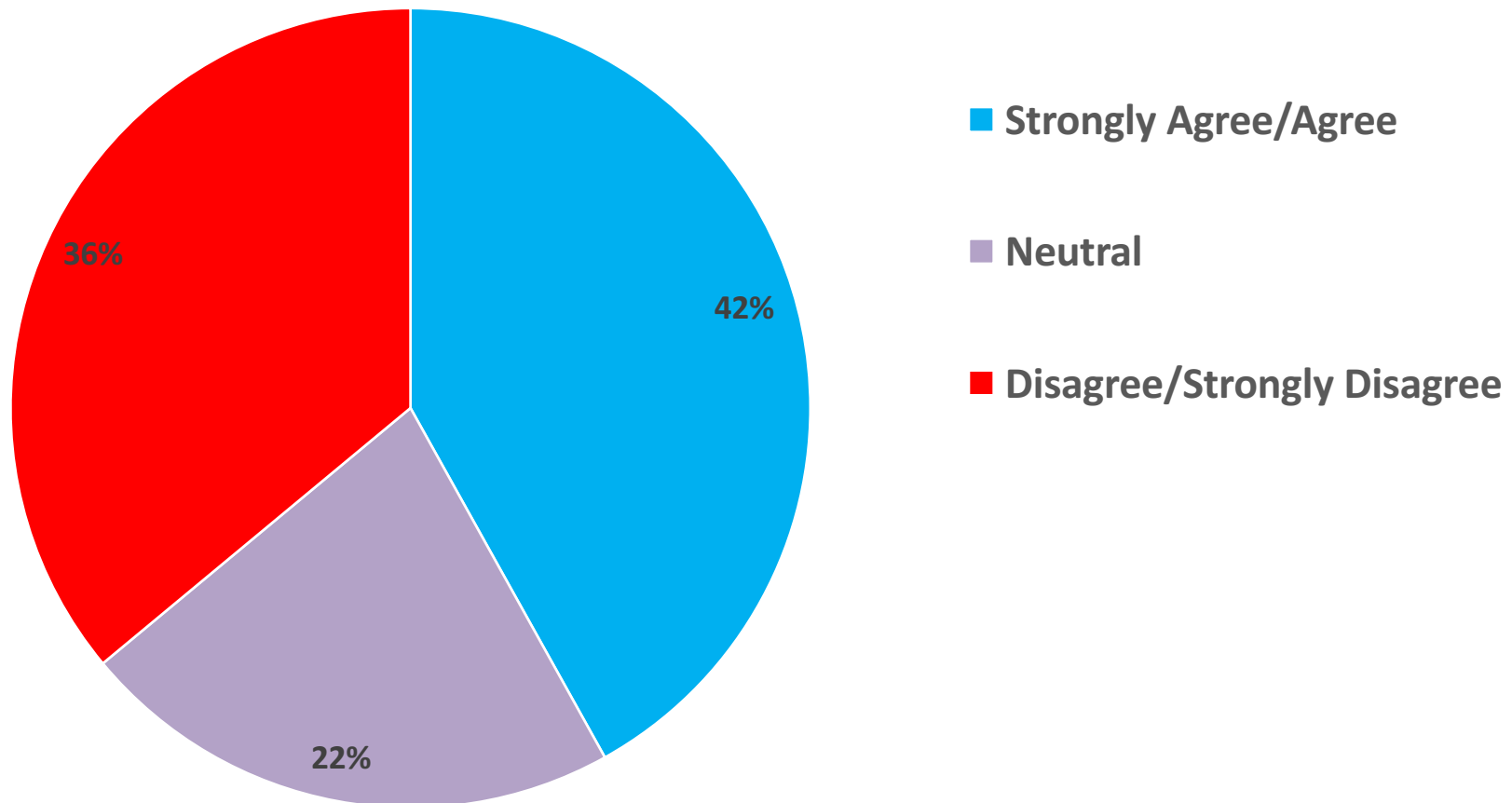
Challenge: student perception of workload



n = 449

Challenge: Assessment expectations lacked clarity

“Assessment criteria and expectations for assignments were clearly outlined.”



n = 730

Challenge: Student perception of inauthentic research

Despite learning real techniques, students perceive an inauthentic research experience

“We all know the research we are doing is unimportant.”

“I felt a very large disconnect with the material”

“Contrived”

The Team



Kathy Nomme



Pam Kalas



Natalie Schimpf



Lynn Norman



Bernadita Germano



Chin Sun

Refocusing the Workload

Prioritised and streamlined tasks and assignments

- Prioritised:
 - scientific investigations (lab & field)
 - written communication
 - anything that did not support those goals was removed
- Individual → group assignments
- Standardised outside of lab format: readings/video & quiz

Clarifying assignment expectations

Provided clear and explicit instructions in a changed format for all assessment

Introduction Assignment Instructions

Weight: 10% of your final Biology 140 grade

Word count: maximum 700 words

Due date: beginning of your Week 7 Lab

This assignment is the first part of the scientific paper you will be writing in this course. In the introduction of a scientific paper, authors provide background information about the organism or the biological system of interest, state the objective of the study including the specific questions they addressed and/or the hypotheses they wanted to test, and justify the importance of the study by addressing how or why the specific topic being investigated is relevant to the scientific field. Refer to '**Scientific Paper Structure**' in the Scientific Conventions for more content and format information.

Specific Content requirements

Animal and its natural habitats:

- Include the animal's common and scientific name;
- Describe the geographic distribution of your animal and the habitats (not merely ecosystems such as temperate forests) where your animal is found;

Clarifying assignment expectations

Developed and provided grading rubrics for all assignments

Introduction Assignment Marking Rubric Total _____ / 34 marks

Content: 25 marks					
Common and scientific names of organism			2 Information and format correct throughout	1 Either information or format incorrect	0 Info completely missing or both info and format incorrect
Description of distribution & habitat		3 Distribution and habitat fully described	2 One described in full, the other missing; Or, both insufficiently described	1 One missing; the other insufficiently described	0 Both missing
Description of behaviour; explanation of importance of behaviour to biology of organism	4 Behaviour fully described; importance fully explained	3 Behaviour described; importance partially explained	2 Behaviour described; importance unclear	1 Behaviour described; importance missing	0 Missing description of behaviour
Reasoning connecting behavior to well-being, evidence from literature and integration of literature (for	4 Logical reasoning, supported by relevant evidence from the literature, literature well-	3 Logical reasoning, supported by evidence from the literature, literature well-integrated (no	2 Reasoning, relevant evidence from literature and integration need improvement	1 Some reasoning, lacking evidence from the literature	0 Reasoning missing

Increasing research authenticity

Increase visibility of UBC research: make explicit links to skills and procedures learned in Bio 140

- UBC research scenarios, multiple times throughout course
- Beaty Biodiversity Museum activity

Scenario 2

Professor Avilés' student Mark is very interested in the intricate webs that some spiders build. Web building is a process that requires energy. First the spiders need energy to make the silk (which is the strongest natural material!); then they have to move around between branches and other structures to attach the silk and construct the web, which also requires energy.

In one species of spider that Mark studies, he noticed that while some individuals build simple webs, others build very complex webs. Mark decides to find out if

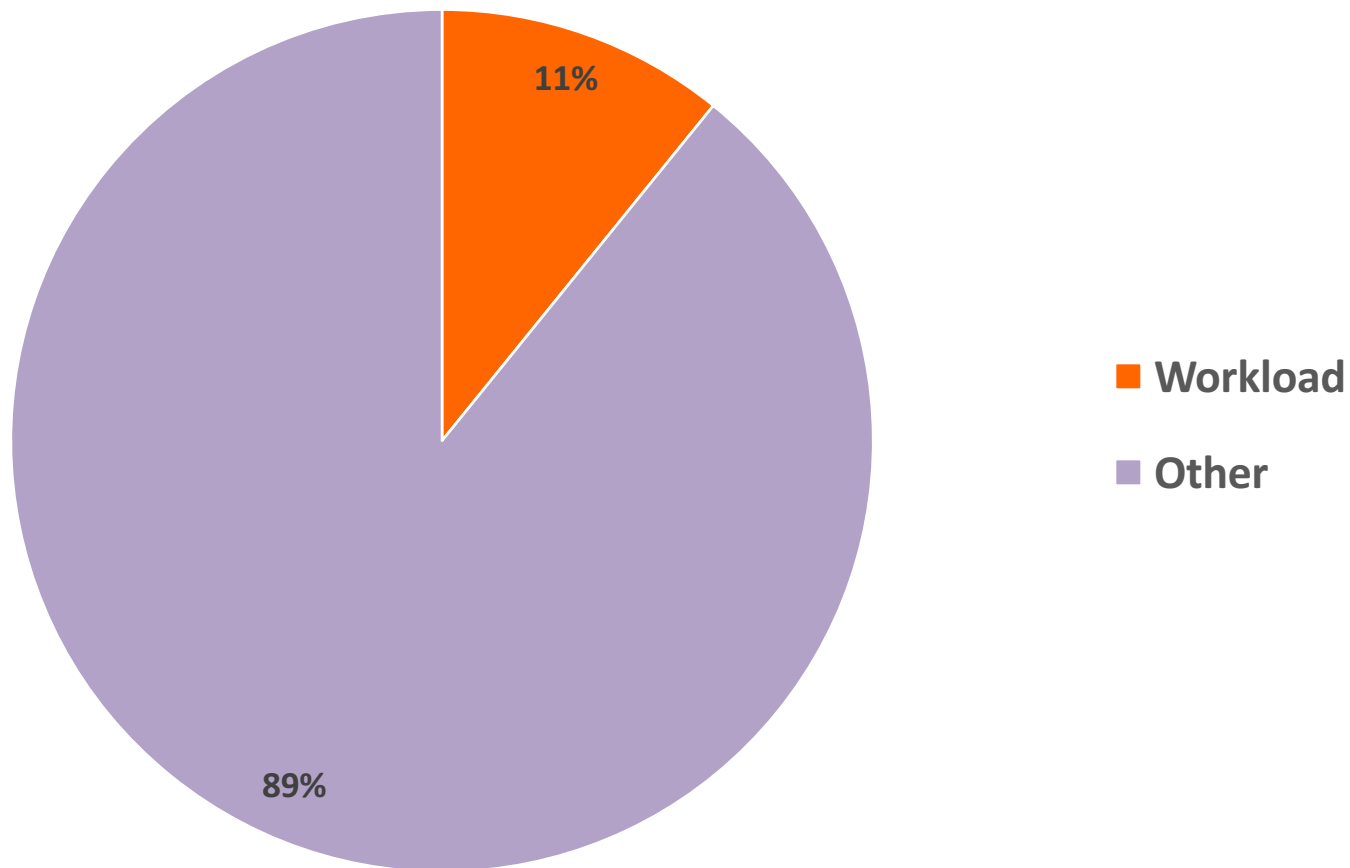
Increasing research authenticity

- Feature UBC researchers in targeted videos
 - Chris Harley (Biodiversity)
 - Allan Carroll (Forest Entomology)
 - Amy Angert (Botany)

Video Snippets

Has it worked? Workload

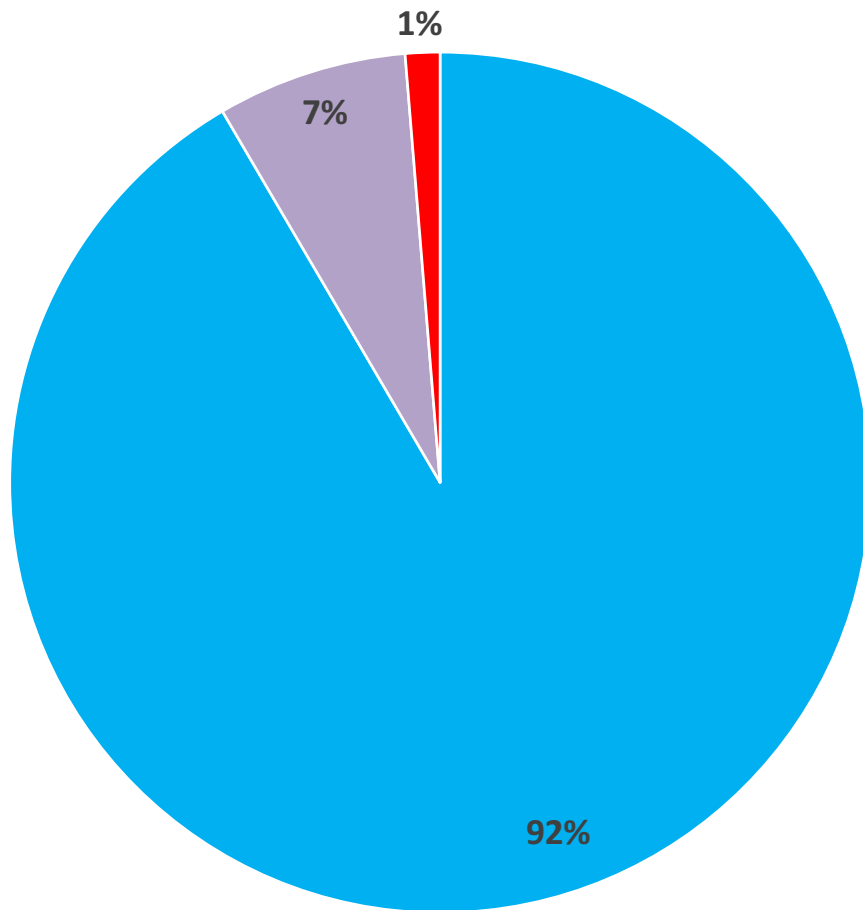
Student-reported time spent each week outside of class: **3.5 h (± 2.7 SD)**



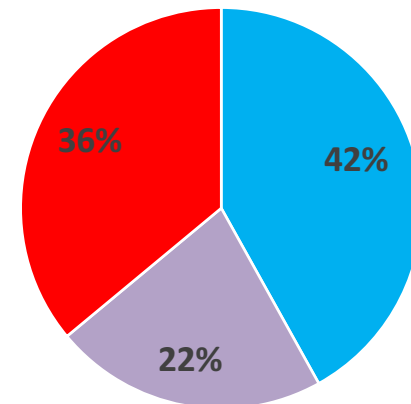
n = 148

Has it worked? Assessment Expectations

“Assessment criteria and expectations for assignments were clearly outlined.”



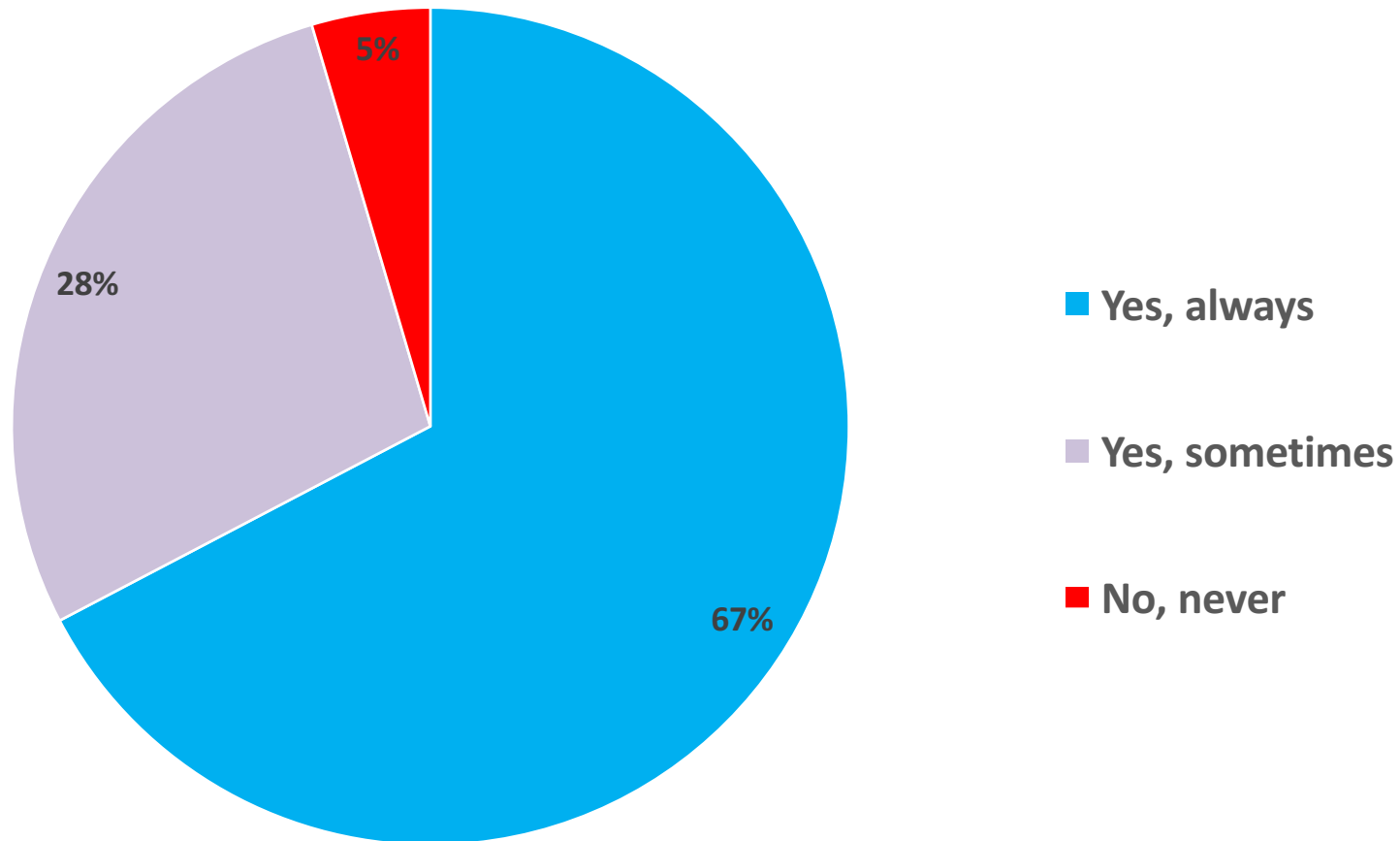
- Strongly Agree/Agree
- Neutral
- Disagree/Strongly Disagree



n = 154

Has it worked? Assessment Expectations

Before submitting your written assignments, did you use the grading rubrics to evaluate your own work?



n = 153

Has it worked? Authentic research

Focus group feedback:

*“I actually do [feel like I conducted real biology research],
yeah!”*

*“In a way, yes [I feel like I conducted real biology
research]”*

*“I remember just sitting there and watching a snail
...and that was it for three hours...and I know that that’s
part of scientific research and that probably means that
I’m not interested”*

Other aspects of Biology 140 Renewal

- Increased scaffolding activities: paper writing and experimental design
- Beaty Biodiversity Museum activity
- Long term goal: increase repeated practice
 - balance adding scaffolding activities & workload
- Evaluation: prelim. data suggest improvement in student writing performance
- TLEF: instructional resources

Acknowledgements

Thanks to ...

- CWSEI
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- Rachel Petrynko, Jessica Dawson, Warren Code
- TAs

TLEF Summary: Current and ongoing

Overall Goals

- 1) improve student learning of the fundamental skills through appropriate scaffolding and opportunities for repeated practice
- 2) raise awareness of UBC research, thereby improving student motivation and perception of biology as a discipline.

TLEF Summary: Current and ongoing

Main resources under development:

- conceptual & UBC researcher interview videos ('draw my life' and researcher profiles styles)
- interactive tutorials ('choose your own adventure')
- background information posters with QR codes
- electronic, interactive lab workbook & conventions

TLEF Summary: Current and ongoing

Main areas targeted:

- designing sound experiments
- drawing rigorous conclusions
- articulating scientific explanations
- integrating evidence from the literature & communicating effectively in a written format.